

ENHANCING OPERATIONAL RISK MANAGEMENT IN THE COMMERCIAL EXPLOSIVES SECTOR: A CASE STUDY OF PT TASUN ANUGERAH BERSAMA

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ABSTRACT

Background: The demand for commercial explosives is rising in tandem with the growth of infrastructure development in Indonesia. Companies like PT Tasun Anugerah Bersama, which provides licensing and distribution services for commercial explosives, face multiple operational risks that require effective risk management. Despite this, PT Tasun has not yet implemented a comprehensive risk management system.

Purpose: This study aims to assess the scope of operational risks, analyze risk levels, and recommend appropriate risk management strategies for PT Tasun.

Design/Methodology/Approach: The research utilizes a risk management framework integrating Godfrey risk control and the risk treatment methods by Flanagan and Norman. It incorporates ISO 31000:2018 for risk management and ISO 45001:2018 for Occupational Health and Safety (OHS).

Findings/Result: The research identifies 26 operational risks, including 14 low-level, 9 moderate-level, 2 high-level, and 1 extreme-level risk. The focus is on managing high and extreme-level risks to enhance business sustainability.

Conclusion: Implementing structured risk management in accordance with ISO standards can significantly minimize operational risks and improve company performance.

Originality/Value: This study provides a novel approach by integrating ISO 31000:2018 and ISO 45001:2018 standards to address the specific operational risks in the commercial explosives sector, offering valuable insights for companies facing similar challenges in high-risk industries.

Keywords: commercial explosives, operational risk, risk management, SNI ISO 31000:2018, SNI ISO 45001:2018

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INTRODUCTION

Infrastructure is one of the main pillars of economic growth in a country, including Indonesia. Good infrastructure enables a country to provide optimal services to its citizens and supports a more efficient economic structure (Aschauer, 1989). Infrastructure encompasses various technical, physical, system, hardware, and software facilities that support economic and social activities. However, according to data from The Global Competitiveness Report 2019 by the World Economic Forum (WEF), Indonesia ranks 72nd out of 141 countries in infrastructure development, indicating that the quality and quantity of infrastructure in Indonesia are still lagging other countries (World Economic Forum, 2019).

This condition negatively affects Indonesia's economic growth efficiency, highlighting the need for active involvement of skilled professionals in the infrastructure development process, such as construction experts and suppliers of supporting materials like explosives. The use of explosives is critical in specific construction activities such as hillside cutting, tunneling, and quarrying, where traditional methods are inefficient or impractical (Laryea, 2008). However, the application of explosives introduces unique operational risks that diverge from the standard risks in the construction sector, such as safety concerns, regulatory compliance, and logistical challenges (Loosemore & Andonakis, 2007). These distinct risks necessitate specialized attention to ensure both safety and operational efficiency.

One type of infrastructure currently being prioritized in Indonesia is toll roads, which are part of the national road network as stipulated by Government Regulation Number 15 of 2005. The construction of toll roads and other infrastructure not only requires physical resources but also effective risk management to address various challenges and threats that arise during construction (Hidayat & Barton, 2012). Poorly managed risks can lead to project failures that harm the economy (Pinto & Slevin, 1988).

Construction work faces various operational risks that can affect the smoothness of projects. Risks in construction projects include safety risks, technical risks, and risks related to the use of explosives for specific projects, such as hillside cutting (Zou, Zhang, & Wang, 2007). Risk management is necessary to mitigate the negative impacts of these risks and ensure project continuity

(Flyvbjerg et al. 2003). Poor risk management can lead to increased costs, delays, and even project failures, which will impact the economic and social performance of a country (Li & Lian, 2019).

In the explosives industry, operational risks extend beyond the construction context to include critical issues such as compliance with stringent safety regulations, proper storage and transportation of hazardous materials, and maintaining stakeholder trust. These risks differ significantly from typical construction risks due to the potential for catastrophic outcomes if not properly managed (Aven, 2016).

PT Tasun Anugerah Bersama (PT Tasun), as a company engaged in the licensing and distribution of commercial explosives, plays an important role in supporting infrastructure projects in Indonesia. However, as a company established in 2020, PT Tasun still faces various operational risks such as communication errors between teams, licensing issues, and delays in the delivery of explosives. These risks not only affect the company's operations but also disrupt the smooth execution of construction projects for its clients (Rani, 2016). Inadequate risk management can worsen the situation and hinder the company's effectiveness in supporting national projects.

The research framework used in this study adopts an operational risk management cycle that includes the following stages: risk identification, risk analysis, risk evaluation, and risk treatment. Unlike previous studies that often focus on generic risk management in the construction sector, this research delves into the specific operational risks faced by companies in the explosives industry. By applying SNI ISO 31000:2018 and SNI ISO 45001:2018, this study ensures that both strategic risk management and occupational safety are addressed comprehensively (BSN, 2019; Loosemore & Andonakis, 2007).

According to research by Zavadskas, Turskis, & Tamosaitiene (2010), risks in the construction industry are not limited to technical aspects but also include managerial risks, such as human resource and logistics management. Therefore, the implementation of risk management based on SNI ISO 31000:2018 and SNI ISO 45001:2018 is crucial to help PT Tasun manage existing risks (BSN, 2019). SNI ISO 31000:2018 provides guidelines for integrating risk management into the company's strategic planning, while SNI

ISO 45001:2018 emphasizes occupational safety and health in high-risk work environments (Loosemore & Andonakis, 2007).

Implementing these standards is expected to mitigate PT Tasun's operational risks, reduce the negative impacts of these risks, and enhance overall company performance (Muthmainnah, 2022). Moreover, effective risk management can help the company cope with uncertainties that arise during business processes and ensure smooth distribution of explosives in compliance with regulations (Laryea, 2008). Aven (2016) also highlights the importance of applying modern risk assessment in operational contexts to ensure business sustainability.

PT Tasun Anugerah Bersama faces various operational risks related to suppliers, consumers, law enforcement, and other partners, which have the potential to hinder business operations and diminish stakeholder trust. To improve operational efficiency and competitiveness in the commercial explosives licensing and distribution industry, the company needs to anticipate and manage these risks through the implementation of risk management based on SNI ISO 31000:2018 and SNI ISO 45001:2018. This study aims to identify the scope of operational risks, analyse risk assessment levels, and formulate mitigation proposals for priority risks faced by PT Tasun Anugerah Bersama.

METHODS

This research was conducted at PT Tasun Anugerah Bersama, located at Jalan Raya Pasir Maung No. 35 RT02/05, Desa Giyanti, Kecamatan Babakan Madang, Kabupaten Bogor, West Java. PT Tasun was chosen as the research object because it is a new company that has not yet implemented risk management based on SNI ISO 31000:2018 and SNI ISO 45001:2018, although both standards are crucial in managing operational risks and ensuring workplace safety in high-risk industries (BSN, 2019). These ISO standards provide a systematic framework for identifying, evaluating, and managing operational risks that can disrupt the company's business processes (ISO, 2018). Data collection and processing for this research were conducted from November 2022 to March 2023.

The types of data used in this study include both primary and secondary data. Primary data were obtained through

questionnaires, observations, and in-depth interviews with internal experts at PT Tasun to gather direct information on the risks faced by the company (Creswell, 2014). Secondary data were collected from various sources, including journals, scientific publications, books, and other documents relevant to operational risk management and the application of ISO standards (Zavadskas et al. 2010). These data sources complement each other to provide a comprehensive understanding of the risks faced by PT Tasun and how they are managed.

The data for this research were collected using a combination of methods. Observation was used to monitor operational activities and identify potential risks at PT Tasun. In-depth interviews were conducted with the operational manager to gain deeper insights into risk management issues, while questionnaires were used to validate and eliminate irrelevant risks. A literature review supported the findings by referencing relevant academic resources, including company documents, journals, and ISO standards.

The sample in this study was selected using non-probability sampling, specifically purposive sampling. This method was chosen because it allows the researcher to focus on individuals with specific knowledge about the research subject, making the information obtained more relevant and in-depth (Palinkas et al. 2015). Respondents were selected based on their understanding of the company's operations and risk management at PT Tasun, using a RACI matrix analysis to determine the key parties involved in the process. The main respondents included the director, two individuals from the operational division (the operational manager and a field worker), and the finance manager, who are considered most knowledgeable about the company's risk context (Flyvbjerg et al. 2003).

Data analysis was conducted through several stages to ensure a systematic and thorough approach. The process began with context establishment, aimed at understanding the company's risk management processes in depth through primary and secondary data analysis. This was followed by risk validation, which ensured the presence of identified phenomena using descriptive statistical methods (Bryman, 2016). The risk elimination stage filtered out irrelevant risks based on questionnaire data. Subsequently, risk assessment was conducted, encompassing risk identification, analysis using Likert scales, measurement, and risk mapping based on Godfrey's methodology (Godfrey, 1996). The

final stage was risk treatment, wherein each risk was assessed and managed using methods developed by Flanagan and Norman (1993) to minimize its impact on the company’s operations. These stages ensured the development of actionable insights for managing and mitigating risks at PT Tasun.

RESULTS

Profile and Organizational Structure of PT Tasun Anugerah Bersama

PT Tasun Anugerah Bersama is a company that provides licensing and distribution services for commercial explosives by transferring ownership of the explosives from the manufacturer to Explosives Business Entities or end users. The commercial explosives typically distributed include ammonium nitrate, dynamite, and detonators. PT Tasun upholds five core values: integrated resources, safety and reliability, professional resources, high-quality standards, and efficiency and effectiveness.

The organizational structure serves as the foundation of a company’s work system. A clear organizational structure provides clarity in positions and coordination, responsibilities, as well as control and oversight of the company’s business processes. The organizational

structure of PT Tasun consists of a chief commissioner, commissioner, president director, director, operational division, and finance division.

Business Process of PT Tasun Anugerah Bersama

The business process clearly outlines each activity carried out by the company. Understanding the business process allows for the identification of potential risks associated with each activity. The development and conceptualization of the business process flowchart below were supported by literature reviews and previous research. The following are the business process activities occurring at PT Tasun, as illustrated in Figure 1.

Risk Management Process

The approach used in this study is a risk management process analysis based on SNI ISO 31000:2018, integrated with SNI ISO 45001:2018. The risk management process analysis begins with the context establishment phase, followed by the risk assessment phase, which includes risk identification, risk analysis, and risk evaluation, and ends with the final phase, risk treatment. The RACI Matrix is a tool or method that can be used to effectively assign tasks and responsibilities to each member within the company. The RACI Matrix for PT Tasun can be seen in Table 1.

Table 1. RACI Matrix of PT Tasun Anugerah Bersama

Business process	The main commission	Commissioner	President director	Director	Operational Division	Finance Division
Purchase Order			I	C	R/A	C/I
Payment	I	I	I	C	C/I	R/A
Request order explosives to supplier			I	R/C	A	C/I
Request order for transportation of explosives to partners			I	R/C	A	C/I
Managing explosives distribution permits	I	I	I	C	R/A	C/I
Distribution of explosives	I	I	I	R/C	A	
Explosives arrive at their destination	I	I	I	C	R/A	

Notes: R = Responsible; A = Accountable; C = Consulted; I = Informed

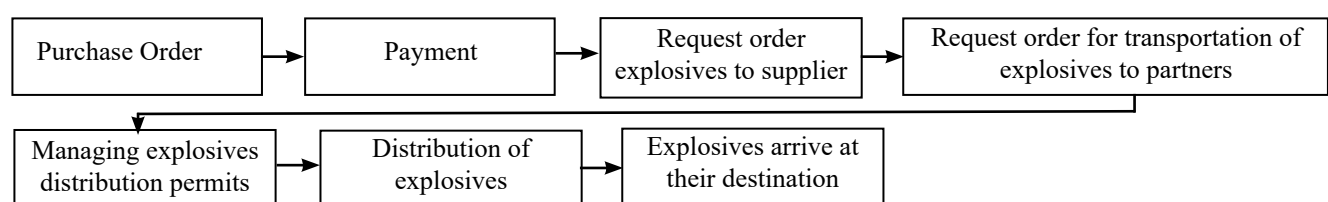


Figure 1. Business process flow of PT Tasun Anugerah Bersama

Context Establishment

This study focuses on risk management in the operational section of the company by analysing internal and external factors. The internal factors in this study are limited to identifying process risks and people risks related to the licensing and distribution processes of explosives. Meanwhile, the external factors include weather conditions and road construction. The sources and respondents in this study include the director, operational manager, field workers, and finance manager, who have an in-depth understanding of the business processes, operational activities, and risk management within the company.

Risk Assessment

The risk assessment phase is divided into three stages: risk identification, risk analysis, and the final stage of risk evaluation and treatment.

Risk Identification

This study identified 26 operational risks at PT Tasan Anugerah Bersama, categorized by their likelihood and impact levels. The application of SNI ISO 31000:2018 and SNI ISO 45001:2018 as a dual framework for managing these risks highlights the unique challenges of the commercial explosives sector. The findings confirm the significance of structured risk management, aligning with the foundational concepts proposed by Godfrey (1996), who emphasized the importance of systematic risk identification and treatment to improve operational efficiency. Similarly, the categorization of risks based

on their likelihood and impact is consistent with the framework suggested by Flanagan and Norman (1993), which supports prioritization in resource allocation for mitigation efforts. The identification of operational risks at PT Tasan is presented in Table 2.

The implementation of risk management based on SNI ISO 31000:2018 is considered insufficient, as PT Tasan operates in the field of licensing and distribution services for explosives, necessitating the integration of an Occupational Health and Safety (OHS) management system based on SNI ISO 45001:2018. From the identified risks, eight risks are integrated with the SNI ISO 45001:2018 management system: driver fatigue (R07), delivery transportation not in accordance with SOP (R17), delays in the delivery of explosives (R18), limited facilities such as dedicated rest areas for explosives (R20), traffic accidents during the transportation of explosives (R21), vehicle damage during delivery (R22), damaged condition of explosives (R24), and severe weather conditions such as rain accompanied by lightning (R25).

Risk Analysis

a. Risk Measurement

Risk measurement is conducted to evaluate the likelihood and impact of risks identified in PT Tasan's operational processes. These measurements are critical for determining the severity of risks and their potential effects on business continuity. The levels of likelihood and impact of risks at PT Tasan are shown in Figure 2.

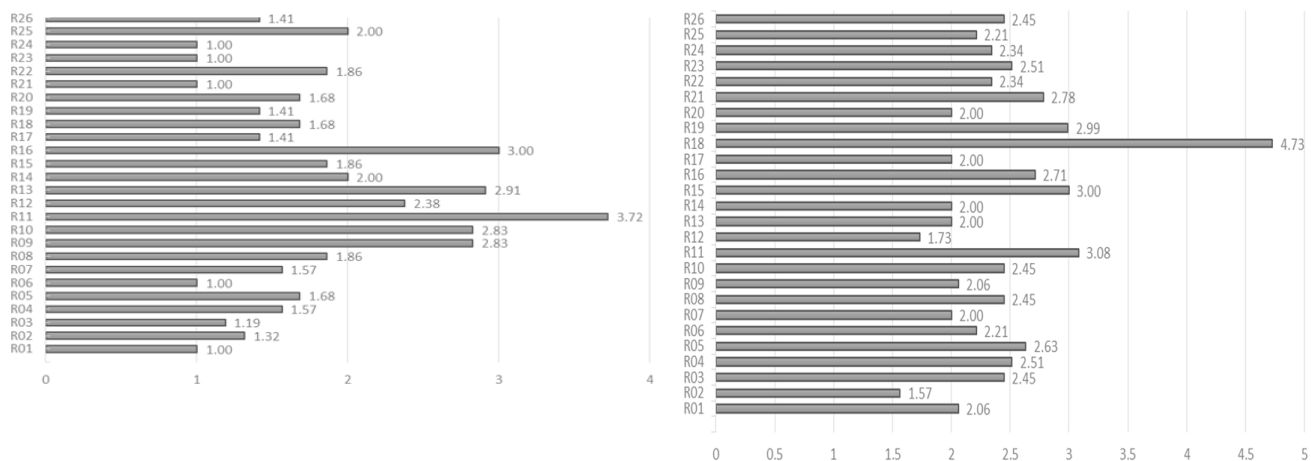


Figure 2. Likelihood and impact levels of risks at PT Tasan Anugerah Bersama

Table 2. Identification of operational risks of PT Tasun Anugerah Bersama

Operational risk areas	Risk code	Operational risk identification	Potential impact of risk
Human Resources (HR)	R01	Mistakes in writing proposals	Inefficiency of time and effort
	R02	Error writing power of attorney	Inefficiency of time and effort
	R03	Typographical errors in invoice letters	Company losses
	R04	Spelling errors in permission letters	Inefficiency of time and effort
	R05	Inaccurate estimation of travel time and route	Increase in operational costs
	R06	Cheating in taking explosives	Company losses
	R07	Sleepy driver	Accidents during the distribution process of explosives
	R08	Miscommunication between office workers and field workers	Increase in operational costs
Explosives Licensing and Distribution System	R09	Changes in consumer demand	Decline in company performance
	R10	Sudden demand from consumers	Difficulty in finding suppliers and managing permits
	R11	Delayed payments from consumers	Hindered income and business processes
	R12	Payments not matching the stated amount	Inefficiency of time and effort
	R13	Limited stock of explosives from the supplier	Increase in operational costs
	R14	Varying quality of explosives	Decrease in consumer trust
	R15	Delivery transportation is difficult to find/unavailable	Business processes are hindered and company performance declines
	R16	Limited inter-island delivery transportation permits	Business processes are hindered and company performance declines
	R17	Delivery transportation not in accordance with SOP	Business processes are hindered and company performance declines
	R18	Delay in explosives delivery	Increase in operational costs
	R19	Cancellation of explosives delivery	Inefficiency of time and effort
	R20	Facilities such as dedicated rest areas for explosives are still limited	The distribution process of explosives is not sufficiently safe
	R21	Traffic accidents during the transportation of explosives	Threatens employee safety and causes losses for the company
	R22	Vehicle damage during delivery	Business processes are hindered and company performance declines
	R23	Discrepancies in the quantity of explosives delivered	Decline in company performance
	R24	Damaged condition of explosives	Inefficiency of time and effort, and endangering workers
External	R25	Severe weather conditions such as rain accompanied by lightning	Business processes become hindered
	R26	Road construction	Delay in the delivery of explosives

b. Risk Mapping

Risk mapping provides a visual representation of the risks faced by PT Tasun, categorized based on their likelihood and impact. This mapping is essential for prioritizing risks and formulating appropriate mitigation strategies. The risk mapping at PT Tasun can be seen in Figure 3.

Risk Evaluation

According to SNI ISO 31000:2018, risk evaluation is a process carried out to support decision-making. The results of the risk evaluation identified fourteen risks with a negligible acceptance level, nine risks with an acceptable acceptance level, two risks with an undesirable acceptance level, and one risk with an unacceptable acceptance level.

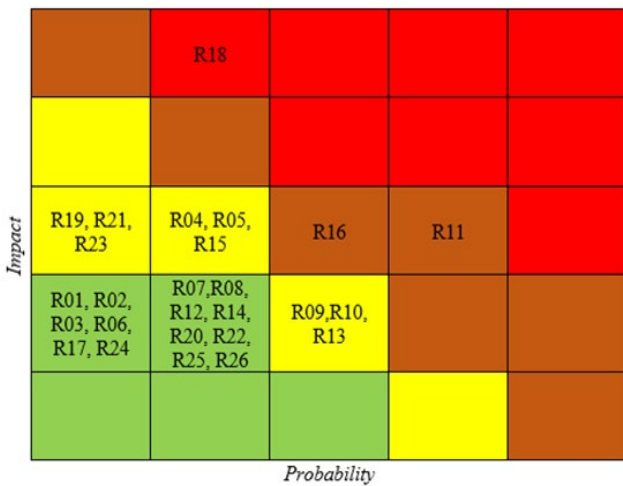


Figure 3. Risk mapping of PT Tasun Anugerah Bersama (Red = Extreme; Orange = High; Yellow = Medium; Green = Low)

Risk Treatment Efforts

According to SNI ISO 31000:2018, risk treatment aims to identify and determine the best risk treatment efforts through preventive actions, such as mitigation of the occurring risks. Based on the risk analysis results, PT Tasun needs to implement risk treatment efforts to address each identified risk. The risk treatment efforts of PT Tasun are presented in Table 3. The risk treatment efforts focus on risks categorized as extreme and high. The following are the treatment efforts for the three identified risks:

Delay in Explosives Delivery (Extreme)

PT Tasun’s internal team needs to conduct in-depth research on current field conditions, including road conditions and weather forecasts during the explosive’s delivery, to ensure that the estimated delivery time specified in the permit is accurate. The internal team should also conduct surveys or inspections of the vehicles to be used for distributing the explosives. This ensures that the vehicles meet SOP standards, reduces the risk of sudden vehicle breakdowns during delivery, and minimizes the risk of traffic accidents. Implement Field Service Management (FSM) to make field activities more effective and efficient. This system allows the company to track job status, vehicle location, field workers, and other statuses in real-time. Additionally, FSM helps reduce the risk of employee fraud as field workers will be more disciplined in performing their tasks.

Delayed Payments from Consumers (High)

The company should establish clear credit and collection policies from the outset. Ensure that all critical information, such as clear due dates, is provided so that consumers have no excuse to delay payments. The finance division should contact consumers after sending the invoice to confirm receipt and highlight the payment terms and due dates. Follow up regularly by phone to encourage timely payment according to the due date. The finance division should communicate payment policies clearly to consumers. Outline all payment terms and conditions in writing on all contracts and invoices, including late payment terms. Additionally, it is necessary to implement penalties for late payments and interest charges on overdue invoices.

Limited Inter-Island Delivery Transportation Permits (High)

Seek other partners and establish contractual agreements so that if one partner is unavailable, another partner can provide the required transportation, thereby reducing the impact of the risk. Good communication with consumers is crucial in service-based companies. Therefore, if difficulties arise during inter-island explosives delivery, PT Tasun should communicate these challenges to consumers. The company can explain any additional costs or time required for inter-island delivery. Through the Association of Explosives Transportation Services, PT Tasun can synergize with other companies engaged in explosives licensing and distribution services to collectively appeal to the government for easier inter-island explosives transportation regulations.

The application of risk treatment measures plays a crucial role in mitigating occupational health and safety risks within an organization. These efforts ensure that companies align their practices with international standards to protect their workers and stakeholders while maintaining operational efficiency. Specifically, the risk treatment efforts related to Occupational Health and Safety (OHS), which refer to the clauses of SNI ISO 45001:2018, are outlined in Table 4. These measures provide a structured framework for addressing potential hazards and enhancing workplace safety.

Table 3. Risk treatment efforts of PT Tasun Anugerah Bersama

Risk code	Risk acceptance	Risk treatment	Activity
R01	Negligible	Retention	Using Google Docs to create a proposal and double check it.
R02	Negligible	Retention	Using Google Docs to create a power of attorney and double check it.
R03	Negligible	Retention	Using Google Docs to create invoices and double check them
R04	Acceptable	Reduction	Using Google Docs to create a permit letter and double check it
R05	Acceptable	Reduction	Conducting more in-depth research and analysis regarding weather and environmental conditions at the time of distribution
R06	Negligible	Retention	Establish clear and strict regulations, and enhance security measures
R07	Negligible	Retention	Ensure drivers have adequate rest time
R08	Negligible	Retention	Conduct regular communication and periodic inspections
R09	Acceptable	Reduction	Be adaptive and prepare stock of explosives
R10	Acceptable	Reduction	Be adaptive and perform tasks quickly and accurately
R11	Undesirable	Transfer	Create a formal written agreement regarding the due date
R12	Negligible	Retention	Coordinate with the relevant parties
R13	Acceptable	Reduction	Be adaptive by seeking alternative suppliers
R14	Negligible	Retention	Establish partnerships with major suppliers
R15	Acceptable	Reduction	Collaborate with more transportation service providers
R16	Undesirable	Transfer	Find and establish partnerships with more transportation service providers
R17	Negligible	Retention	Conduct thorough inspections of the transportation to be used
R18	Unacceptable	Avoidance	Conduct in-depth research on field conditions
R19	Acceptable	Reduction	Create a stamped contract stating that the explosives cannot be canceled
R20	Negligible	Retention	Conduct strict supervision
R21	Acceptable	Reduction	Inspect the transportation and drivers, ensuring they are in good condition
R22	Negligible	Retention	Inspect the condition of the transportation to be used
R23	Acceptable	Reduction	Inspect and carefully recheck the quantity of explosives
R24	Negligible	Retention	Check the quality of the explosives before shipment
R25	Negligible	Retention	Conduct in-depth research on weather conditions at the time of distribution
R26	Negligible	Retention	Find alternative routes that are passable

Table 4. Risk treatment efforts referring to SNI ISO 45001:2018 clauses

Clause	Risk treatment efforts	Activity	
Organizational Context	Understanding the organization and its context	Restrictions on explosives storage areas	
	Understanding the needs and expectations of workers and other stakeholders	Provide a safe workplace free from unsafe acts and unsafe conditions, while ensuring the health and safety of workers.	
	Determining the scope of the Occupational Health and Safety (OHS) management system	Company management is divided into two: administrative management and field management, with OHS management focusing on field management.	
	Leadership and Worker Participation	Leadership and commitment	Leaders conduct field visits and are involved in administrative aspects.
		OHS Policy	Committed to protecting the safety and health of all workers and individuals involved in the company's activities.
Planning	Roles, responsibilities, and authorities of the organization	Define the roles, responsibilities, and authorities related to the OHS management system for workers in each department or function, considering their understanding of the OHS management system.	
	Worker consultation and participation	Provide timely access to relevant information regarding the OHS management system in a clear and easily understandable manner.	
	Actions to address risks and seize opportunities	Identify issues or risks from company activities, followed by a risk assessment that prioritizes risks for corrective actions.	

Table 4. Risk treatment efforts referring to SNI ISO 45001:2018 clauses (continue)

Clause	Risk treatment efforts	Activity
	OHS objectives and planning to achieve them	The OHS management objectives are at the operational level, and in its implementation, a Land Transportation Safety Management System (SMKTD) can be developed for vehicles transporting explosives.
Support	Resources	Prepare finances, human resources, technology, IT, infrastructure, equipment, and external assistance.
	Competence	Workers must have knowledge and experience related to the OHS management system. If not, external consultants can be employed to support the workers.
	Awareness	Workers must be aware of OHS policies, OHS hazards, and OHS opportunities. In the event of a workplace accident, workers should be able to manage the situation and understand the proper response procedures.
	Communication	Conduct internal and external communication in implementing the OHS management system.
	Documented information	Consisting of procedures and records stored in paper, electronic, or photographic formats for use in meetings, OHS socialization, audits, inspections, legal aspects, and other purposes.
Operation	Operational Planning and Control	Installing safety signs when handling hazardous chemicals, using Personal Protective Equipment (PPE), and conducting a safety briefing.
	Readiness and emergency response	Once the emergency preparedness and response procedures have been completed, these procedures must be communicated to all employees within the organization, including permanent, temporary workers, and the surrounding community.
Performance Evaluation	Monitoring, measurement, analysis, and performance evaluation	Management must conduct monitoring and performance evaluations related to the Occupational Health and Safety (OHS) management system. Performance evaluations, commonly known as Key Performance Indicators (KPIs), use tools such as the Balanced Scorecard or other methods. KPIs include lagging indicators such as Total Recordable Incident Rates (TRIR) and/or Severity Rates (SR), and leading indicators such as the number of training sessions, meetings, campaigns, audits, inspections, and others.
	Internal audit	The internal audit team prepares the internal audit program schedule, develops procedures, and sends employees for training to become internal auditors.
	Management review	The company can conduct a management review of the OHS management system at six-month intervals, discussing the performance of the management system based on SNI ISO 45001:2018.
Improvement	General	Improvements are made based on KPIs.
	Incidents, non-conformities, and corrective actions	To address incidents and non-conformities, the company can conduct an analysis for improvement, prepare a report, and allocate a budget to plan and implement corrective actions.
	Continuous improvement	The company can achieve continuous improvement by addressing actual weaknesses in each clause of SNI ISO 45001:2018, which can be done on a monthly, quarterly, semi-annual, and annual basis.

The research builds on the premise that high-risk industries require specialized risk management approaches to ensure both safety and operational continuity. This aligns with Aven (2016), who emphasized the importance of integrating modern risk assessment techniques to manage uncertainty in complex operations. The study's hypothesis that effective risk management enhances operational performance is supported by the results, which indicate that prioritizing high and extreme risks significantly reduces potential disruption.

The findings agree with previous studies in construction and high-risk industries. For instance, Zou, Zhang, and Wang (2007) identified miscommunication and inadequate safety measures as major risks in construction projects, which are also observed in PT Tasun's operations. However, this study expands the understanding by focusing on the unique risks associated with the explosives industry, such as licensing delays and compliance with inter-island transportation permits. Compared to Li and Lian (2019), who examined generic risk management in infrastructure projects, this research provides a more tailored approach by integrating ISO standards specifically suited for high-risk operations.

Managerial Implication

Based on the research findings, implementing risk management based on SNI ISO 31000:2018 and SNI ISO 45001:2018 is crucial for PT Tasun Anugerah Bersama in managing operational risks that could impact the company's business sustainability. Managers need to strengthen risk treatment strategies by conducting more comprehensive planning as well as periodic risk analysis and evaluation, at least once a year. This monitoring aims to identify and mitigate the potential emergence of new risks that could disrupt company operations. Previous research indicates that regular evaluations and risk oversight can enhance the effectiveness of risk management and support strategic decision-making (Olson & Wu, 2010). Additionally, it is important for management to involve all stakeholders, including consumers, suppliers, and transportation service partners, to ensure that risk perspectives are considered from various angles, making mitigation strategies more effective and targeted.

Furthermore, the company should deepen the implementation of occupational safety standards in accordance with SNI ISO 45001:2018 to minimize risks related to worker safety and field operations. Integrating these standards will help manage occupational health and safety risks, increase stakeholder trust, and ensure compliance with applicable regulations. Broader risk management should also include analysis of technological, external, legal, and financial risks to build a more robust and adaptive mitigation framework in response to evolving business dynamics. With a more holistic approach, the company can enhance competitiveness and operational efficiency while reducing losses from unforeseen risks.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the analysis conducted, there are 26 identified operational risks at PT Tasan Anugerah Bersama, which include: eight HR-related risks, sixteen risks associated with licensing and distribution of explosives, and two external risks. According to the risk assessment results, out of the 26 identified operational risks, fourteen are classified as low risk, nine as medium risk, two as high risk, and one as extreme risk. From a theoretical perspective, this research contributes to the development of a risk management approach based on SNI ISO 31000:2018 and SNI ISO 45001:2018, which has rarely been specifically applied in the commercial explosives sector. These findings enrich academic knowledge regarding operational risk management in high-risk industries. Risk treatment efforts focus on extreme and high-risk levels to reduce the likelihood or impact of these risks by taking preventive actions and implementing mitigation measures. Risk treatment efforts involve transferring risks that are beyond the company's control by engaging third parties, establishing communication with various stakeholders to assist in managing risks, and integrating Occupational Health and Safety (OHS) standards to minimize the impact of each risk.

Recommendations

It is recommended that the company implement risk treatment through comprehensive strategic planning and conduct regular risk management analysis and evaluations, at least once a year. Monitoring and re-

evaluation should be carried out to reduce the likelihood and impact of new risks in the company's operations. This research has analyzed risk management from the company's management perspective, so future research is advised to involve other stakeholders, such as consumers, suppliers, and transportation service partners, to gain a broader perspective. Additionally, this study has not delved into the implementation of SNI ISO 45001:2018 standards, so it is recommended that future research conduct a more in-depth analysis of these standards to enhance occupational health and safety within the company. Further research could also expand the analysis by exploring technological, external, legal, regulatory, and financial risks to provide a more comprehensive understanding of the various challenges faced by the company.

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